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ABSTRACT

This paper explores the effects of limited experience resulting from professional immobility on faculty teaching and research role orientations and faculty productivity. The correlates of institutional inbreeding treated as a form of immobility are examined. Data are provided from a large-scale, nationally representative survey of college and university faculty members. This study examines a broad array of dependent variables, including time spent in research, self-reported commitment to teaching, and total number of published articles during a scientists' professional lifetime. (CS)

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The Impact of Inbreeding and Immobility on the Professional Role and Scholarly Performance of Academic Scientists*

by

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The Impact of Inbreeding and Immobility
on the Professional Role and Scholarly
Performance of Academic Scientists*

Although the practice of institutional inbreeding, the recruiting of graduates of an institution to fill its academic vacancies, has diminished in recent years, the strenuously debated implications of inbreeding are becoming increasingly salient as institutions of higher education are confronted with extended periods of limited turnover in faculty positions. Adversaries of inbreeding argued that the recruitment and prolonged retention of former students inhibits institutional progress and vitality. The practice, it was postulated, stiffles creativity and innovation and encourages the maintenance of the status quo (Fitzpatrick, 1917; Ford, 1928; Reeves et al., 1933; Wilson, 1942; Smythe and Smythe, 1944), by employing individuals who have never tested alternative opportunities and who are, as a result, "out of touch" with the realities of their discipline and lacking the broad outlook necessary for academic achievement (Fitzpatrick, 1917; Ford, 1928; Reeves et al., 1933; McNeely, 1932; Wilson, 1942; Smythe and Smythe, 1944).

Implicit in these concerns are considerations of the effects of immobility among faculty. Indeed, as the debate heightened, opponents addressed their concerns toward those "pure" inbred scholars whose entire professional experience was limited to the confines of a single institution by virtue of their being recruited directly from the graduating classes of the employing institution. Removed from the controversy were inbred scholars whose professional careers were not restricted to a single institution. These silver cord scholars were recruited back to their alma mater after having held positions outside their degree granting institution. The distinction between pure inbred and silver cord faculty was based on an assumed qualitative difference between

these groups; a difference brought about by the unique experiences gained by silver cord scholars by virtue of maneuvering in the academic market place, i.e. mobility. It was the pure inbred faculty who, lacking exposure to varied experiences, a network of external collegial ties, and broad professional and scholarly "cosmopolitan" activities, were shown to carry heavier teaching loads (McGee, 1960), garner fewer research grants (McGee,1960), publish fewer scholarly works (Eells and Cleveland, 1935; Blau, 1973) and command lower levels of reputational success (Eells and Cleveland, 1935; Hargens and Farr, 1973; Reeves et al., 1953).

These concerns are not unlike the concerns expressed by contemporary educators. The current overproduction of potential new faculty in many fields, and the commensurate decreasing mobility, increased aging, and tenuring-in of large numbers (and proportions) of faculties have severely limited turnover in faculty positions. Consequently, educators are questioning anew the effects of limited experience resulting from professional immobility on faculty teaching and research role orientations and faculty productivity.

Despite the similarities between the underlying premises regarding the effects of inbreeding and the effects of immobility, apparently the two phenomena have not been examined simultaneously. Yet, pure inbreeding can be viewed as a unique form of faculty immobility. Pure inbreds represent perhaps the least mobile segment of the academic community. Carefully delineating and reexamining the career patterns, academic roles, and professional accomplishments of inbreds may improve our understanding of the effects of immobility, since many of the observations attributed directly to inbreeding may not be unique to inbreds but more pervasive and generally indicative of the less mobile segment of the academic community.

This paper provides a broad reexamination of the correlates of institutional inbreeding treated as a form of immobility. A typology of inbreeding,

revised to account for career mobility, is advanced. The data are derived from a large-scale, nationally representative survey of college and university faculty members; analyses are based on a subsample of doctorate level teaching faculty. Unlike most earlier studies that focus on single criterion variables (research quantity, research quality, or scholarly recognition), the present study examines a broad array of dependent variables.

A Typology of Inbreeding-Mobility Status

Unfortunately the traditional typology of inbreeding accounts for mobility only among the inbred category of faculty. Historically the noninbred comparison group included both mobile and immobile scholars. The revised typology advanced below disentangles the noninbred group into its mobile and immobile components.

Taking three specific points in time and mobility status yields the 8 cell typology shown in Figure 1. The shaded cells constitute logically impossible combinations of the variables. The remaining cells indicate the major categories of the independent variable to be dealt with in this paper (the capitalized descriptors) and the terminology applied to these variables in previous studies (the parenthesized descriptors).

The upper portion of Figure 1 deals solely with faculty currently holding a position at their degree granting institution. Of the four possible career paths, one is logically impossible and for purposes of this report, two can be collapsed. As a result two alternative career patterns remain viable; the first labeled pure inbred, identifies those faculty members who took their first position with, and are currently employed by their degree granting institution. They have been immobile throughout their professional career. Silver cord faculty, like pure inbreds, are also employed by their highest degree institution. Their employment at this institution however, has not been continuous. At some point in their professional career they have been employed out-

side this institution.

The lower portion of Figure 1 identifies the possible career paths of faculty who are not currently holding a position at their degree granting institution. The adherents, like pure inbreds, have remained immobile since accepting their first professional position; however, unlike pure inbreds, adherents accepted a position at an institution other than that which granted their highest degree. The remaining two possible cells of Figure 1, labeled acanome, identify faculty who have held positions in at least two different organizations since attaining their highest degree.

Historical terminology as applied to the groups just described is provided in the form of parenthesized cell descriptors. The most important distinction is found in the cell which for present analyses is labeled adherent. In prior research these immobile individuals have been collapsed together with the acanome faculty to form a composite comparison group designated noninbreds.

The Data

Survey Source

In the 1972-73 academic year, the American Council on Education undertook a national general-purpose survey of college and university faculty members. Included was a sample of 108,722 faculty and staff in a nationally representative sample of 301 higher education institutions. A total of 53,034 (48.8 percent) responded. Of the respondents, 42,345 were identified as currently active teaching faculty.[1]

A smaller research file updated with additional data was drawn from this larger respondent file and included all male faculty who reported holding a Ph.D. and were either trained in or recently held an academic appointment in physics, economics, sociology, or earth science. The sample was limited to male faculty members since females number only eighty-three, an inadequate

number to support the kinds of multivariate analyses reported below. This procedure resulted in a total subsample of 2,322--168 pure inbreds (7.2 percent), 843 adherents (36.3 percent), 123 silver cords (5.3 percent), and 1,188 acanomes (51.2 percent).

Variables for Analysis

The primary independent variable is inbreeding-mobility status as defined above. Each of the four inbreeding-mobility status types are treated as dummy variables which take on a value of one when the typological conditions are satisfied, and a value of zero when they are not satisfied. The dependent variables fall into two main categories - academic role and professional performance. The variables selected represent research and broad professional and scholarly "cosmopolitan" roles of academic scientists as well as "local" orientations manifested in lesser professional commitments, greater concern with the goals of the employing institution, and greater focus on an institutional career and teaching roles (Gouldner, 1957; Glaser, 1964). With the exception of two indicators of professional performance, all dependent variables are derived directly from the survey instrument.

A summary description of all variables is provided below; summary statistics are reported in Table 1, showing distributions for the sample on each variable by the four inbreeding-mobility status categories. Also shown in Table 1 are the number of cases utilized for the analyses of each variable; this varies somewhat because cases with missing data are omitted in the analyses and the amount of missing information for respondents on each questionnaire item varies. The dependent variables, and the coding used for them in the analyses, are listed below:

1: During the present term, how many hours per week, on the average, are you actually spending in connection with your staff position in: research and scholarly writing? (continuous variable, using midpoints of precoded categories as noted in Table 1).

2: During the present term, how many hours per week, on average, are you actually spending in connection with your staff position in: scheduled teaching (give actual, not credit hours)? (continuous variable, using midpoints of precoded categories as noted in Table 1).

3: With how many different classes (including different sections) are you meeting this term? (continuous variable, using midpoints of precoded categories as noted in Table 1).

4: How many different courses (not sections of the same course) are you teaching? (continuous variable, using midpoints of precoded categories as noted in Table 1).

5: How many articles have you published in academic and professional journals? (continuous variable, using midpoints of precoded categories as noted in Table 1).

6: How many scholarly books, manuals, or monographs have you written or edited, alone or in collaboration? (continuous variable, using midpoints of precoded categories as noted in Table 1).

7: Number of citations to published works. (continuous variable).[2]

8: Number of scholarly works cited in published literature. (continuous variable).[2]

Analytical Procedure

For each variable two regression equations are estimated. The first (shown in the left panel of each table) represents the results of regressing the dependent variable on inbreeding status employing the traditional measure of inbreeding. The second (shown in the right panel) represents the results of regressing the dependent variable on inbreeding-mobility status employing the revised typology.

The first equation is included to determine whether the previously observed relationships are maintained using nationally representative data. The second equation indicates whether this relationship is maintained using the revised typology as well as providing the necessary refinements to compare the two groups of immobile faculty (pure inbreds and adherents). Of particular interest in this second equation are the regression coefficients for pure inbreeding and adherency. These results are used to test the hypotheses that the regression coef-

ficients for pure inbreeding and adherency are equal. The F-values shown in Table A1 (Appendix A) are measures of the significance of the difference between these coefficients.

Recent publications that have attempted to generalize findings from an aggregate of scientists from diverse fields have shown substantial cross-field differences in research-professional activities (Hagstrom, 1965; Hagstrom, 1967; Lehman, 1953), and have noted that this assumption does not always hold and there is reason to doubt the adequacy and applicability of this practice or of the utility of generalizing the findings derived from one discipline to that of another (see for example, Bayer and Dutton, 1977; Cole and Cole, 1973; and also Hargens and Farr, 1973 for the applicability of this finding to research on inbreeding).

Therefore, in combining data for the total number of published articles, total number of published books and monographs, number of scholarly works cited in published literature, and number of citations to published works, the disciplinary differences in means and standard deviations have been eliminated by computing field-specific standardized scores rather than using simple raw scores (Blalock, 1972: 100-101). Other variables, such as prestige of departmental affiliation have not been standardized in this manner since they are created in such a way as to yield comparable distributions from field to field and/or are less dependent on disciplinary phenomena and more dependent on institutional prerogatives.

Results

Time spent in research is one measure of faculty research role orientation. A certain degree of discretion is allowed each faculty member in determining how out-of-class time is to be allocated between teaching and research efforts. Some choose to devote the majority to improving teaching activities while others choose

to use this time largely to pursue research interests. It is this personal assessment of commitment which is reflected in the self-reported measure of research orientation.

The results of the regression of time spent in research are summarized in the left half of Table 2. As expected, prestige of current academic department, career age and institutional nativity (inbreeding) have fairly sizeable and statistically significant relationships with the dependent variable. These relationships are also in the direction predicted above.

As noted earlier, the primary task of this paper is to determine whether this observed relationship is indeed unique to inbred scholars. Results reported under the heading "Revised Typology" in Table 2 provide additional explication of this relationship. When employing the revised typology pure inbreeding and adherency both show independent relations with the dependent variable; both coefficients are negative and similar in magnitude indicating that these faculty place comparable emphasis on research. Indeed the statistical comparison indicates that these regression coefficients are not significantly different. Thus, we conclude that both groups of immobile faculty spend less time in research than their mobile colleagues; that there is no evidence here to suggest that inbreeding has any particular independent relationship with research role orientation; that both groups of immobile faculty espouse similar research orientations; that the more salient predictor of research orientation appears to be immobility.

Self-reported commitment to teaching, in terms of time devoted to the activity, is the second faculty role analyzed. Since time is not a limitless commodity, it is not unreasonable to assume that as the amount of time devoted to one activity increases, the amount of time available to devote to another decreases. Indeed, pure inbred and adherent faculty have been shown to spend less time in research than their mobile colleagues. One alternative strategy is to follow

more closely a teaching role orientation.

Results of the regression of time devoted to teaching on prestige of current academic department, career age, and inbreeding-mobility status are shown in Table 3. The differences in teaching commitment between inbred and non-inbred faculty suggested in the literature are not evident in this analysis after differences in departmental prestige are taken in account. The lack of significance persists whether using the historical conceptualization or the revised conceptualization of faculty inbreeding-mobility status. The results for adherent scholars, on the other hand, are significant ($p < .05$). Even after the effects of departmental prestige are accounted for, adherent faculty report spending more time in teaching than acanome faculty.

Substantially the effect of adherency is questionable. The unstandardized coefficient falls well below 1.0 and the standardized coefficient is almost negligible. Furthermore, the difference between the coefficients for pure inbreeding and adherency is not large enough to bring about rejection of the null hypothesis that these coefficients are equal. This limited evidence suggests that neither inbreeding, in particular, nor immobility, in general, are related to personal teaching role orientation.

Regardless of the personal teaching commitment espoused, most faculty are expected to support the teaching commitment of the university. This commitment is generally spelled out in terms of the number of classes and courses offered, the strength of the teaching faculty, and the emphasis on graduate education. Since institutional policy may assign a particular group of faculty a greater share of the university teaching commitment, possible differences among the inbreeding-mobility status groups may arise. Two areas where differences may exist are in the assignment of class loads and class preparations.

Given the results of the earlier analysis of time devoted to the teaching

activity, it is unlikely that widely divergent results between faculty groups will be uncovered in these analyses. Indeed, once the influence of departmental prestige has been accounted for, neither inbred scholars as historically identified nor pure inbred faculty as currently conceptualized appear to carry significantly higher class loads than their noninbred counterparts (Table 4). Similarly, the results do not support the hypothesis that adherent faculty class loads deviate markedly from those carried by pure inbred faculty (Table A1, Appendix A).

Variations in teaching loads are not solely measured in terms of the number of times or hours per week a faculty member stands in front of a class. Although this technique provides a meaningful measure of teaching responsibility, it ignores a crucial element in teaching i.e., preparation time. A further measure of teaching responsibility identifies the number of different courses for which the faculty member is expected to prepare; that is, the number of different preparations required.

Neither inbred nor pure inbred faculty report more preparations than their noninbred colleagues (Table 5). Again, adherent faculty report more preparations ($p < .05$) than acanome faculty and preparations similar to pure inbred faculty (Table A1, Appendix A). As encountered in the analyses of time devoted to teaching, the regression coefficients for adherency are extremely small and provide minimal substantive significance.

Little evidence has been found to indicate that inbreeding is related to teaching orientation. In each case the analyses support the hypothesis that inbred faculty are equally committed to and carry similar responsibility for the teaching activities of the university as their mobile colleagues. Moreover, no support was found for the hypothesis that the teaching activities of pure inbred faculty and adherent faculty differ significantly.

The evidence to this point has been based on all faculty. Since the variables under study are often implicitly, if not explicitly, assumed to vary among academic ranks, potential significant relationships may have been mitigated when using faculty at all ranks. To measure the impact of these work load differences, analyses are presented for faculty at three professorial ranks. For purposes of these analyses, faculty inbreeding-mobility status is identified as shown in the revised typology.

Table 6 displays the results of the regression of time devoted to research on prestige of current institutional department, career age, and the inbreeding-mobility status variables for assistant, associate, and full professors respectively. At each professorial rank, prestige of department enters as a positive and significant predictor ($p < .01$). Conversely, career age is negatively related to research time. At both the associate and full professor ranks younger faculty report devoting more time to research than older faculty ($p's < .01$). This result is consistent with the theory that early promotion is enhanced by active research endeavors. At the assistant level no significant relationship between career age and research effort is discovered. Of greatest interest are the coefficients for pure inbreeding and adherency. At the assistant professor rank there is a small relationship between research time and the two immobile faculty types. Since the coefficients are not of sufficient size to attain statistical significance, it is concluded that there is no difference between faculty groups at the assistant professor level on this measure of research orientation. However, by the time faculty have gained the experience necessary to advance to the associate and full professor ranks, the magnitudes of the negative associations between inbreeding and research time and adherency and research time have increased sufficiently to attain statistical significance.

Unfortunately the data do not allow a formal test to determine the under-

lying causes, although tentative conclusions may be suggested. (McGee (1960), suggests that institutional discrimination in the allocation of tasks and rewards is responsible for the differences in academic role and reward. Equally likely at this point, however, is the possibility that the immobile group select themselves out of the research oriented group in favor of other alternative activities. As suggested by McNeely (1932), these faculty may lack the broad outlook necessary for academic achievement. Support for one of these alternative explanations may be gained from an analysis of teaching activities.

The number or preparations required and the class load carried are typically outlined as part of the institutional guidelines covering faculty and staff activities. As such, these guidelines detail those activities which may be largely controlled by institutional policy rather than individual faculty wishes. Those faculty who are successful in reducing their preparation and class loads most often trade these activities for a larger commitment in research or administrative areas. Seldom are faculty members successful in reducing the time and commitment in one area without negotiating on the basis of increased activity and commitment in another.

As shown in the previous table, as faculty advance through the academic ranks the difference in self-reported time devoted to research by immobile faculty and mobile faculty increases. If the greater activity noted among the mobile group is based on formal negotiations at the institution level, it is likely that class loads and the number of preparations required for mobile faculty will show decreases corresponding to this increase in research activity. On the other hand, if this research has not been formally negotiated, then no significant relationships between inbreeding-mobility status and class load and inbreeding-mobility status and the number of preparations would be anticipated. Under this condition self-selection rather than discriminatory institutional

policy is a more viable explanation.

Tables 7 through 9 present results of the regression analyses of time spent in teaching, number of classes taught, and number of preparations required on the array of independent variables for each of the three professorial ranks. For each of the dependent variables under consideration, the data do not indicate significant relationships between the inbreeding-mobility status faculty types and the measures of teaching for the assistant professor rank. Since assistant professor is the typical rank designation for individuals new to the academic environment, these data support the hypothesis that entry level faculty groups enjoy similar teaching responsibilities regardless of academic nativity. In addition, there is no evidence to suggest that teaching activities differ among the inbreeding-mobility status groups at the associate or full professor ranks. The increase in the amount of time devoted to research does not appear to be formally negotiated.

Although these data do not provide conclusive evidence, they support the theory that self-selection rather than discriminatory institutional policy facilitates the difference in research activity among faculty groups. Within each of the three professorial ranks, that portion of faculty activity that comes under the control of institutional policy (class load and preparations) does not vary across faculty types. On the other hand, research activity which is self-reported and more nearly subject to individual faculty discretion does vary across faculty types.

The fifth dependent variable, total number of published articles during a scientists' professional lifetime, is shown to be negatively related with pure inbreeding ($p < .01$) and adherency ($p < .01$). The two coefficients are nearly identical suggesting that immobility is the more salient predictor. The F-value shown in Table A1 is of insufficient size to attain significance. Thus, the

hypothesis that these coefficients are equivalent cannot be rejected and we conclude that both groups of immobile faculty have produced fewer published articles than their more mobile peers and that the more salient predictor of article production is immobility (Table 10).

The fact that immobile faculty fair less well than mobile faculty in terms of publishing articles does not by definition fully determine their productivity in the area of book and monograph preparation. In the overall sample, article publication and book publication are moderately correlated (.37), indicating that a limited degree of success in predicting book publication is expected given information on article publication.

Table 11 summarizes the results of regressing productivity, in terms of books and monographs published, on departmental prestige, career age, academic role, and inbreeding-mobility status. Net of its associations with these other variables, book and monograph productivity does have an association with institutional nativity; the association is positive ($p < .01$), and the inverse of that experienced for article productivity. Similar results are noted when employing the revised typology. Pure inbreeding is positively associated with book publication ($p < .01$); however adherency appears to have no independent association with book and monograph productivity. The difference between the regression coefficients for pure inbreeding and adherency is sufficiently large to allow for rejecting the hypothesis that these coefficients are statistically equal ($p < .01$).

Although it is beyond the scope of the current research, results of the analyses of article publication and book and monograph productivity suggest that mobility may cause greater interruption in book preparation than article preparation. The long-term stability, security in knowing the "system," awareness of the changing nature and operation of the institution, reductions in the

"conditions of challenge" and increases in the "conditions of security," which are potential outcomes of inbreeding, may aid the scientist in securing the time and resources to complete the time-consuming task required (Pelz, 1967).

The number of citations made to a scientist's previously published work is commonly used to measure the "quality" of a scientist's research output. While there are limitations to this variable, it has been shown to be an important independent indicator of research performance and gives less weight to the "operator" who produces quantity as opposed to the scholar who produces quality (Bayer and Folger, 1966; Cole and Cole, 1967; Chubin, 1973). A degree of independence between quantity and "quality" can be expected since "quality" is not fully determined merely by publication frequency. For the entire sample, the correlation coefficient of this variable with total number of published articles is .33 and with total number of published books and monographs, .17.

Table 12 summarizes the results of the regression employing citations as the dependent variable. Net of the associations with departmental prestige, career age, and academic role, inbreeding as historically defined is negatively related to citation frequency ($p < .05$). This is indicative of both pure inbreds ($p < .01$) and adherents ($p < .01$). Comparison of the two regression coefficients does not allow for rejection of the hypothesis that inbreeding and adherency exert equivalent influences on the dependent variable (Table A1, Appendix A).

Citation frequency has limitations. For example, the author of a seminal article or book may be awarded innumerable citations by a large group of scholars. On the other hand, a colleague may be very prolific, publishing several pieces of research which each receive relatively few citations. In this example it is easily seen that each individual could garner approximately the same number of citations, yet be of quite different stature in their chosen discipline.

It has been shown that immobile faculty garner fewer citations. It is not known whether this is due to lower productivity levels or if in fact immobile scholars produce as many cited sources but fewer citations to these sources.

Table 13 summarizes the results of regressing number of sources cited in published literature on departmental prestige, career age, academic role and inbreeding-mobility status (multiple citations to the same source are counted as a single observation). Inbred scholars, although producing slightly fewer citations than noninbred faculty (Table 12) do not publish fewer cited publications (Table 13). After further specification of the institutional nativity and mobility history of university faculty, a significant relationship between pure inbreeding and cited sources emerges. Pure inbred scholars do garner fewer cited sources than acanome faculty ($p < .05$). In fact, both those who have been inbred throughout their career and noninbred immobile faculty tend to be less productive, in terms of "quality" of publications as measured by the number of cited sources, than those who are neither inbred nor immobile. These relationships are evident even after the effects of departmental prestige, career age, and academic role have been controlled. Furtheremore, the differences between pure inbred faculty productivity and adherent faculty productivity that do exist are so slight as to be likely attributable to sampling error. (Table A1, Appendix A).

Discussion

Current changes in the economic position of higher education, coupled with declining enrollment growth rates for the future, have raised anew some of the traditional questions in higher education (e.g. tenure) and introduced new questions to higher education policy (e.g. early retirement programs). Many of these issues are subsumed under the general topic of "steady-state staffing" and have given rise to numerous discussions of the relationship of low turnover

in faculty positions to faculty role orientation and performance.

The results from the present exploratory analyses, based on a nationally representative sample, introduce preliminary findings on the relationship of faculty immobility to an array of professional teaching and research activities and related accomplishments. While the data and the methodology do not allow the disentangling of alternative explanatory hypotheses, they do establish viable relationships between the effects of inbreeding and the effects of immobility.

The results of the analyses indicate that the academic roles and professional accomplishments of mobile faculty and immobile faculty diverge as scholars advance to higher levels of academic rank. Although no differences were noted in the area of teaching responsibilities, immobile faculty do devote increasingly less time pursuing research interests in the latter years of their academic careers. McNeely (1932) hypothesized that inbred scholars, showing this same tendency to withdraw from research activities, "lacked the broad outlook necessary for academic achievement." Since these role orientations cannot be attributed to pre-existing differences at the time of entry into the higher education community and are detected only after faculty have been employed long enough to attain senior rank and establish a mobility history, these data suggest that this outlook is more pervasive--that immobility allows individuals to become steeped in the traditions and practices of a single institution, and move further from the forefront of their discipline out of touch with the external collegial research network.

This gradual reduction in research interest is also reflected in professional performance. The analyses indicate that even after controlling for the effects of departmental prestige, career age, and faculty role orientation, scientists who have remained immobile throughout their careers are generally less productive in terms of quantity and "quality" of publications than their

mobile colleagues. With one exception (number of books and monographs published), negative relationships between inbreeding and measures of performance and adherency and measures of performance were detected. Again, the evidence indicates that the more salient predictor of professional performance is immobility. Indeed, at the time of entry into the higher education teaching community no differences in performance among inbreeding-mobility status groups were detected. Immobile faculty, although not initially less productive, tend to fall behind their mobile colleagues in later years, even after differences in departmental prestige, career age, and academic role are taken into account.

Finally, the results provide no definitive answer to the effects of inbreeding or immobility on the career roles and performance of academic scientists. However, the results do suggest that the concerns expressed by opponents of inbreeding may be applicable to a much larger segment of the academic community. The evidence indicates that immobility rather than inbreeding is a more salient indicator of research interest and professional performance. Institutions of higher education not only need to cope with problems of declining enrollment and fiscal uncertainty, but must remain cognizant of the implications of faculty immobility to research commitment and professional productivity.

FOOTNOTES

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1. A national normative report was prepared by Bayer (1973). A more recent summarization appears in Bayer (1974).

2. Variables 7 and 8 are derived from the 1973 Science Citation Index, or for economists and sociologists, from the 1973 Social Science Citation Index. They are quasi-qualitative indexes of the impact and recognition of the scientists work by others. While there are limitations to these variables, they have been shown to be important independent indicators of research performance and gave less weight to the "operator" who produces quantity as opposed to the scholar who produces quality. Extended discussion of these quasi-qualitative measures based on citations is presented in Bayer and Folger 1966; Cole and Cole, 1967; Chubin, 1973.

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FIGURE 1

A Typology of Inbreeding-Mobility

Highest Degree and Current Position Institution	Mobility Since Beginning Professional Career			
	Immobile		Mobile	
	Highest Degree and First Professional Position Institution			
	same	not same	same	not same
same	PURE INBRED (inbred)		SILVER CORD (silver cord)[a]	SILVER CORD (silver cord)[a]
not same		ADHERENT (noninbred)	ACANOME (noninbred)	ACANOME (noninbred)

[a]Early analysts (prior to 1958) often included these silver cord scholars in the noninbred category.

TABLE 1

Distribution of Faculty Members on
Selected Academic Role and Professional Performance
Variables by Inbreeding-Mobility Status

(Figures in Table are Percentages)

Variable Description	Pure Inbred	Silver Cord	Adherent	Acanome	Total All Faculty
Average time (hours in research per week (N=2,238)					
None	3.7	1.8	2.7	2.1	2.4
1-4	9.9	8.0	8.4	9.6	9.1
5-8	14.8	12.4	13.1	11.0	12.0
9-12	15.4	15.0	19.4	15.2	16.8
13-16	16.7	12.4	14.7	16.3	15.5
17-20	19.1	21.2	18.2	17.2	17.9
21-34	9.9	20.4	16.1	20.8	18.3
35-44	9.9	5.3	5.0	5.9	5.8
45+	0.6	3.5	2.3	1.9	2.1
Average time (hours) in scheduled teaching per week (N=2,225)					
None	5.1	3.5	1.6	1.3	1.8
1-4	28.7	33.0	17.9	25.2	23.2
5-8	44.6	40.0	47.0	48.2	47.1
9-12	16.6	17.4	27.1	19.3	21.8
13-16	3.2	5.2	4.3	3.8	4.0
17-20	0.6	0.9	1.6	1.4	1.4
21-34	1.3	0.0	0.5	0.5	0.5
35-44	0.0	0.0	0.0	0.2	0.1
45+	0.0	0.0	0.0	0.1	0.1
Number of different classes, including different sections, meeting this term (N=2,175)					
None	2.7	3.4	0.4	1.2	1.1
1	32.7	35.0	20.9	28.1	26.2
2	30.7	36.8	41.1	40.7	39.9
3	23.3	15.4	26.5	18.5	21.6
4	5.3	4.3	5.9	6.8	6.2
5	1.3	0.0	1.7	2.0	1.7
6	2.7	3.4	2.3	1.8	2.1
7+	1.3	1.7	1.3	1.0	1.1

TABLE 1 (Cont.)

Variable Description	Pure Inbred	Silver Cord	Adherent	Acanome	Total All Faculty
Number of different courses, not sections of same course, meeting this term (N=2,172)					
None	2.7	2.6	0.3	1.1	1.0
1	40.5	41.2	28.9	35.5	33.7
2	37.8	42.1	51.4	48.7	48.5
3	16.2	13.2	17.7	12.6	14.7
4	2.0	0.0	1.3	2.0	1.7
5	0.7	0.9	0.3	0.3	0.3
6	0.0	0.0	0.0	0.0	0.0
7+	0.0	0.0	0.1	0.0	0.1
Total number of published articles (N=2,282)					
None	8.5	0.0	9.6	1.9	5.1
1-2	7.1	3.2	17.3	3.8	9.0
3-4	9.9	4.8	15.7	7.3	10.4
5-10	25.7	18.8	22.2	20.3	21.4
11-20	22.5	17.5	20.0	25.9	23.0
21-50	16.0	37.9	12.3	27.8	21.8
51+	10.3	17.8	2.9	13.0	9.3
Total number of published books and monographs (N=2,292)					
None	34.7	39.0	50.1	40.8	43.8
1-2	33.8	31.9	30.9	32.5	32.1
3-4	14.5	14.2	10.4	14.2	12.7
5-10	9.3	10.8	5.2	9.6	8.0
11+	7.7	4.1	3.4	2.9	3.4
Number of citations to published works (N=2,322)					
None	32.8	21.0	39.4	21.0	28.6
1-5	38.8	25.3	36.9	33.9	34.7
6-20	15.7	27.4	16.0	25.8	21.8
21-40	6.6	12.4	4.8	10.8	8.3
41+	6.1	13.9	2.9	8.5	6.5
Number of scholarly works cited in the literature (N=2,322)					
None	32.8	20.5	39.6	20.7	28.5
1-2	31.7	19.9	31.4	24.8	27.2
3-6	15.8	27.1	18.1	26.4	22.6
7-10	6.9	7.7	4.4	11.5	8.3
11+	12.8	24.8	6.5	16.6	13.4

TABLE 2

RESULTS OF THE REGRESSION OF TIME SPENT IN RESEARCH ON PRESTIGE OF CURRENT DEPARTMENT, CAREER AGE AND INBREEDING-MOBILITY STATUS

Independent Variables	Traditional Typology			Revised Typology		
	b	B	F	b	B	F
Prestige of Current Department	1.616	.217	96.457*	1.583	.212	92.717*
Career Age	- .181	-.153	50.744*	- .208	-.176	61.661*
Inbred/Pure Inbred	-2.398	-.059	7.409*	-3.111	-.076	11.890*
Silver Cord	- .331	-.007	.103	- .897	-.019	.745
Adherent	...	...	...	-1.792	-.081	12.086*
(Constant)	15.923	...	...	17.097	...	...
R^2	.059		33.076*	.064		29.017*

*F-value significant at $p < .01$.

TABLE 3

RESULTS OF THE REGRESSION OF TIME SPENT IN TEACHING ON PRESTIGE OF CURRENT DEPARTMENT, CAREER AGE AND INBREEDING-MOBILITY STATUS

Independent Variables	Traditional Typology			Revised Typology		
	b	B	F	b	B	F
Prestige of Current Department	- .694	-.244	122.451*	- .686	-.242	119.402*
Career Age	.010	.021	.990	.016	.036	2.627
Inbred/Pure Inbred	- .098	-.006	.085	.079	.005	.053
Silver Cord	- .022	-.001	.003	.118	.006	.088
Adherent	...	...	...	.444	.052	5.087**
(Constant)	8 712	...	...	7.921	...	...
R^2	.059		33.169*	.061		27.604*

*F-value significant at $p < .01$.

**F-value significant at $p < .05$.

TABLE 4

RESULTS OF THE REGRESSION OF NUMBER OF CLASSES TAUGHT ON PRESTIGE OF CURRENT DEPARTMENT, CAREER AGE AND INBREEDING-MOBILITY STATUS

Independent Variables	Traditional Typology			Revised Typology		
	b	B	F	b	B	F
Prestige of Current Department	- .143	-.168	56.213*	- .140	-.165	54.004*
Career Age	.003	.019	.743	.005	.036	2.501
Inbred/Pure Inbred	.050	.011	.240	.110	.024	1.101
Silver Cord	- .073	-.013	.375	- .025	-.005	.045
Adherent	...	...	...	.150	.059	6.312**
(Constant)	2.490	...	...	2.392	...	...
R^2	.028		15.252*	.031		13.495*

*F-value significant at $p < .01$.

**F-value significant at $p < .05$.

TABLE 5

RESULTS OF THE REGRESSION OF NUMBER OF PREPARATIONS REQUIRED ON PRESTIGE OF CURRENT DEPARTMENT, CAREER AGE AND INBREEDING-MOBILITY STATUS

Independent Variables	Traditional Typology			Revised Typology		
	b	B	F	b	B	F
Prestige of Current Department	- .124	-.229	107.264*	- .123	-.227	104.472*
Career Age	- .001	-.008	.145	.001	.006	.084
Inbred/Pure Inbred	.038	.012	.329	.069	.023	1.123
Silver Cord	- .014	-.004	.034	.012	.003	.023
Adherent	...	...	...	.083	.051	4.850**
(Constant)	2.085	...	...	2.030	...	...
R^2	.053		29.380*	.055		24.517*

*F-value significant at $p < .01$.

**F-value significant at $p < .05$.

TABLE 6

RESULTS OF THE REGRESSION OF TIME DEVOTED TO RESEARCH ON PRESTIGE OF CURRENT DEPARTMENT, CAREER AGE AND INBREEDING-MOBILITY STATUS BY ACADEMIC RANK

Independent Variables	Assistant Professor			Associate Professor			Full Professor		
	b	B	F	b	B	F	b	B	F
Prestige of Department ...	1.51	.21	20.82*	1.26	.16	14.90*	1.82	.25	60.60*
Career Age	- .02	-.01	.01	- .33	-.14	11.26*	- .20	-.15	22.97*
Inbred/Pure Inbred	-1.65	-.04	.64	-4.54	-.11	6.38*	-2.67	-.07	4.66**
Silver Cord	1.52	.02	.18	.83	.02	.17	-2.12	-.05	2.69
Adherent	- .46	-.02	.15	-1.94	-.09	4.21**	-2.42	-.10	9.88*
(Constant)	15.71	...	...	18.55	...	...	16.57	...	...
R^2	.04		4.48**	.05		6.09**	.08		17.57*

*F-value significant at $p < .01$.

**F-value significant at $p < .05$.

TABLE 7

RESULTS OF THE REGRESSION OF TIME DEVOTED TO TEACHING ON PRESTIGE OF CURRENT DEPARTMENT, CAREER AGE AND INBREEDING-MOBILITY STATUS BY ACADEMIC RANK

Independent Variables	Assistant Professor			Associate Professor			Full Professor		
	b	B	F	b	B	F	b	B	F
Prestige of Department	- .74	-.27	37.48*	- .81	-.26	41.20*	- .59	-.21	43.99*
Career Age	- .15	-.11	5.28**	.05	.05	1.77	.06	.12	14.73*
Inbred/Pure Inbred	- .82	-.05	1.15	1.19	.07	3.16	- .28	-.02	.36
Silver Cord	-1.44	-.05	1.22	.22	.01	.08	.23	.06	.23
Adherent	- .14	-.06	.10	.20	.02	.30	.54	.01	3.35
(Constant)	9.38	...	...	8.07	...	...	6.63	...	...
R^2	.10		10.43*	.07		8.65*	.06		12.78*

*F-value significant at $p < .01$.

**F-value significant at $p < .05$.

TABLE 8

RESULTS OF THE REGRESSION OF NUMBER OF CLASSES TAUGHT ON PRESTIGE OF CURRENT DEPARTMENT, CAREER AGE AND INBREEDING-MOBILITY STATUS BY ACADEMIC RANK

Independent Variables	Assistant Professor			Associate Professor			Full Professor		
	b	B	F	b	B	F	b	B	F
Prestige of Department ...	- .18	-.23	26.28*	- .14	-.16	15.50*	- .12	-.14	17.43*
Career Age	- .04	-.10	3.60	.01	.06	1.94	.01	.09	7.42*
Inbred/Pure Inbred	.11	.02	.23	.01	.00	.00	.12	.02	.60
Silver Cord	.51	.06	1.80	- .39	-.08	3.34	.05	.01	.12
Adherent	- .64	-.03	.24	.04	.01	.10	.24	.08	6.49**
(Constant)	2.88	...	...	2.32	...	...	2.11	...	...
R^2	.06		6.03**	.03		4.71**	.03		6.09**

*F-value significant at $p < .01$.

**F-value significant at $p < .05$.

TABLE 9

RESULTS OF THE REGRESSION OF NUMBER OF PREPARATIONS REQUIRED ON PRESTIGE OF CURRENT DEPARTMENT, CAREER AGE AND INBREEDING-MOBILITY STATUS BY ACADEMIC RANK

Independent Variables	Assistant Professor			Associate Professor			Full Professor		
	b	B	F	b	B	F	b	B	F
Prestige of Department ...	- .15	-.30	47.64*	- .12	-.21	26.19*	- .11	-.19	36.01*
Career Age	- .01	-.06	1.34	.01	.04	1.02	.01	.05	3.02
Inbred/Pure Inbred	.06	.02	.17	.15	.05	1.38	.02	.01	.06
Silver Cord	.26	.05	1.25	- .02	-.00	.01	- .02	-.01	.06
Adherent	.03	.02	.17	.05	.03	.55	.09	.05	2.57
(Constant)	2.21	...	...	1.98	...	...	1.86	...	...
R^2	.10		10.54*	.05		5.68**	.04		9.04*

*F-value significant at $p < .01$.

**F-value significant at $p < .05$.

TABLE 10

RESULTS OF THE REGRESSION OF NUMBER OF ARTICLES PUBLISHED (STANDARDIZED) ON PRESTIGE OF CURRENT DEPARTMENT, CAREER AGE, PROFESSIONAL ROLE AND INBREEDING-MOBILITY STATUS

Independent Variables	Traditional Typology			Revised Typology		
	b	B	F	b	B	F
Prestige of Current Department	.094	.136	44.298*	.091	.401	42.318*
Career Age	.048	.435	502.606*	.044	.132	396.237*
Time in Research	.017	.188	91.263*	.017	.180	85.018*
Time in Teaching	- .020	-.080	16.468*	- .019	-.075	14.881*
Inbred/Pure Inbred	- .152	-.039	4.194**	- .249	-.064	10.835*
Silver Cord	.165	.037	3.650	.089	.020	1.065
Adherent	...	...	...	- .244	-.117	32.718*
(Constant)	- .990	...	...	- .830	...	...
R^2	.275		129.571*	.286		117.455*

*F-value sifnificant at $p < .01$.

**F-value significant at $p < .05$.

TABLE 11

RESULTS OF THE REGRESSION OF NUMBER OF BOOKS PUBLISHED (STANDARDIZED) ON PRESTIGE OF CURRENT DEPARTMENT, CAREER AGE, PROFESSIONAL ROLE AND INBREEDING-MOBILITY STATUS

Independent Variables	Traditional Typology			Revised Typology		
	b	B	F	b	B	F
Prestige of Current Department	.020	.030	1.941	.020	.029	1.893
Career Age	.046	.418	411.123*	.045	.415	371.225*
Time in Research	.011	.119	33.206*	.011	.118	32.702*
Inbred/Pure Inbred	.234	.061	8.913*	.227	.059	7.998*
Silver Cord	- .073	-.016	.644	- .078	-.018	.718
Adherent	...	...	...	- .016	-.008	.130
(Constant)	- .972	...	...	- .860	...	...
R^2	.184		92.184*	.184		76.809*

*F-value significant at $p < .01$.

TABLE 12

RESULTS OF THE REGRESSION OF NUMBER OF CITATIONS (STANDARDIZED) ON PRESTIGE OF CURRENT DEPARTMENT, CAREER AGE, PROFESSIONAL ROLE AND INBREEDING-MOBILITY STATUS

Independent Variables	Traditional Typology			Revised Typology		
	b	B	F	b	B	F
Prestige of Current Department	.148	.211	84.241*	.146	.208	82.365*
Career Age	.010	.087	15.599*	.007	.062	7.341*
Time in Research	.009	.092	17.007*	.008	.087	15.151*
Class Load	- .077	-.093	12.231*	- .075	-.090	11.527*
Preparations	.090	.069	6.511**	.092	.071	6.886*
Inbred/Pure Inbred	- .172	-.044	4.100**	- .244	-.062	7.858*
Silver Cord	.075	.016	.579	.019	.004	.039
Adherent	...	...	...	- .180	-.085	13.458*
(Constant)	- .541	...	...	- .427	...	...
R^2	.078		24.641*	.084		23.374*

*F-value significant at $p < .01$. **F-value significant at $p < .05$.

TABLE 13

RESULTS OF THE REGRESSION OF NUMBER OF SOURCES CITED (STANDARDIZED) ON PRESTIGE OF CURRENT DEPARTMENT, CAREER AGE, PROFESSIONAL ROLE AND INBREEDING-MOBILITY STATUS

Independent Variables	Traditional Typology			Revised Typology		
	b	B	F	b	B	F
Prestige of Current Department	.139	.196	73.162*	.136	.193	71.220*
Career Age	.013	.119	29.639*	.010	.091	15.853*
Time in Research	.010	.110	24.505*	.010	.104	21.983*
Class Load	- .082	-.098	13.576*	- .079	-.094	12.744
Preparations	.084	.064	5.590**	.086	.066	5.997**
Inbred/Pure Inbred	- .119	-.030	1.929	- .202	-.051	5.338**
Silver Cord	.067	.015	.454	.002	.001	.001
Adherent	...	...	...	- .209	-.098	17.934*
(Constant)	- .582	...	...	- .451	...	...
R^2	.084		26.894*	.092		25.969*

*F-value significant at $p < .01$. **F-value significant at $p < .05$.

APPENDIX A

TABLE A1

Statistical Significance of the Difference Between the Regression Coefficients for Pure Inbred and Adherent Scholars

Dependent Variable	Regression Coefficients		Table Number	F-Value
	Pure Inbred	Adherent		
Time Spent in Research	-3.111a	-1.792a	2	2.194
Time Spent in Teaching	.079	.444a	3	1.148
Classes Taught	.110	.150a	4	.146
Preparations	.069	.083a	5	.036
Time in Research (Asst)	-1.649	- .465	6	.042
Time in Research (Assoc)	-4.536a	-1.945a	6	2.360
Time in Research (Full)	-2.668a	-2.416a	6	.374
Time in Teaching (Asst)	- .822	- .138	7	2.854
Time in Teaching (Assoc)	1.191	.202	7	2.271
Time in Teaching (Full)	- .283	.536	7	.969
Classes Taught (Asst)	.109	- .642	8	.584
Classes Taught (Assoc)	.006	.037	8	.019
Classes Taught (Full)	.118	.243a	8	.679
Preparations (Asst)	.057	.033	9	.481
Preparations (Assoc)	.146	.051	9	.579
Preparations (Full)	.023	.095	9	.032
Articles Published	- .249a	- .244a	10	.006
Books Published	.227a	- .016	11	8.639*
Citations	- .244a	- .180a	12	.506
Sources Cited	- .202a	- .209a	13	.006

[a] Significance of the regression coefficients in the original equation. F-value significant at $p < .05$.

* F-value significant at $p < .01$.

** F-value significant at $p < .05$.